WHAT IS CLAIMED IS:

1. An optical fiber for producing laser radiation at a characteristic wavelength, the optical fiber comprising:

a first multimode core region having a first index of refraction, the core region being adapted for guiding the laser radiation in a longitudinal direction of the fiber and adapted for guiding pump radiation; and

an active region embedded within the core region for producing radiation at the characteristic wavelength when pumped by pump radiation, the active region having a sufficiently small transverse dimension such that radiation produced in the active region is not confined to the active region.

2. The optical fiber of claim 1, wherein less than about 50% of the radiation produced at the characteristic wavelength in the active region is confined in the active region.

3. The optical fiber of claim 1, wherein less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined in the active region.

4. The optical fiber of claim 1, wherein less than about 5% of the radiation produced at the characteristic wavelength in the active region is confined in the active region.

5. The optical fiber of claim 1, wherein less than about 2% of the radiation produced at the characteristic wavelength in the active region is confined in the active region.

6. The optical fiber of claim 1, wherein the transverse dimension of the active region is smaller than the characteristic wavelength.

7. The optical fiber of claim 1, wherein the active region has a second index of refraction different from the first index of refraction, and the combination of the transverse dimension of the active region and the difference between the first index of refraction and the second index of refraction are such that the radiation produced in the active region is not confined to the active region.

8. The optical fiber of claim 1, wherein the desired mode is the lowest order mode of the optical fiber.

9. The optical fiber of claim 1, wherein the desired mode is a Gaussian mode of the optical fiber.

10. The optical fiber of claim 1, wherein the optical fiber has a gain along its longitudinal direction that is sufficiently small, so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold.

11. The optical fiber of claim 1, further comprising a mode discriminator for discriminating against undesired modes of light generated in the multimode fiber while allowing a desired mode of light to propagate in the multimode fiber.

12. The optical fiber of claim 11, wherein the mode discriminator is a free space propagation path defined between a mirror and the first multimode fiber.

13. The optical fiber of claim 12, further comprising an optical element located in the free space propagation path, and

wherein the optical element is adapted to transmit light emitted from the first multimode fiber in a desired mode and retroreflected by the mirror back into the multimode fiber and is adapted not to transmit light emitted from the first multimode fiber in undesired modes back into the first multimode fiber.

14. The optical fiber of claim 13, wherein the optical element is a mirror.

15. The optical fiber of claim 11, further comprising:

a second multimode optical fiber for guiding the laser radiation, and

wherein the mode discriminator is a free space propagation path between the first multimode fiber and the second multimode fiber.

16. The optical fiber of claim 15, further comprising:

an optical element located in the free space propagation path, and

wherein the optical element is adapted to transmit light emitted from the first multimode fiber in a desired mode into the second multimode optical fiber.

17. The optical fiber of claim 16, wherein the optical element is a lens.

18. The optical fiber of claim 11, wherein the mode discriminator is a fiber grating.

19. The optical fiber of claim 11, further comprising:

a second multimode optical fiber for guiding the laser radiation, and

wherein the mode discriminator is a third multimode fiber located between the first multimode fiber and the second multimode fiber.

20. The optical fiber of claim 19, wherein the third multimode fiber has an index of refraction that varies in the radial direction of the fiber.

21. The optical fiber of claim 11, wherein the mode discriminator is a tightly bent section of the optical fiber.

22. The optical fiber of claim 21, wherein the tightly bent section of the optical fiber is bent substantially in the shape of a kidney.

23. The optical fiber of claim 11, wherein the mode discriminator is multitple tightly bent sections of the optical fiber, the bent sections laying substantially in non-parallel planes.

24. The optical fiber of claim 23, wherein at least one tightly bent fiber section of the optical fiber is bent substantially in the shape of a kidney.

25. The optical fiber of claim 1, further comprising a mode discriminator means for discriminating against undesired modes of light generated in the multimode fiber while allowing a desired mode of light to propagate in the multimode fiber.

26. The optical fiber of claim 25, wherein the transverse dimension of the active region is smaller than the characteristic wavelength.

27. The optical fiber of claim 25, wherein the desired mode is the lowest order mode.

28. The optical fiber of claim 25, wherein the desired mode is a Gaussian mode.

29. The optical fiber of claim 25, wherein the optical fiber has a gain along its longitudinal direction that is sufficiently small so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold.

30. A method of providing laser energy with a characteristic wavelength in a single optical mode to a surface, the method comprising:

pumping an active region embedded in a multimode optical fiber with pump energy to produce the laser energy with the characteristic wavelength, wherein the active region has a transverse dimension smaller than the characteristic wavelength; and

guiding the generated light to the surface with the multimode fiber.